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## Household consumer debt, endogenous money and growth: A supermultiplier-based analysis

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The last decades have witnessed dramatic institutional and socio-economic transformations, which have been labeled by some scholars as the “neoliberal cycle”.<sup>1</sup> One of their most evident aspects has been a pronounced rise in household indebtedness across a vast majority of OECD countries, which prompted a growing interest in the macroeconomic effects and implications of household consumer debt. Indeed, according to many authors of different persuasions (see for example Cynamon, Fazzari, 2008; 2013; 2015a; 2015b; Barba, Pivetti, 2009; Palley, 2009; Rajan, 2010; Dejuán, 2013b; Stockhammer, 2015) debt-financed consumption has been, in the last decades, one of the main engines of growth. While this argument seems well established and quite popular nowadays, at least among non-mainstream economists, there exists some degree of disagreement about the explicit formalization of these processes.

In this article, I will try to appraise the ability of some existing heterodox growth models<sup>2</sup> to include debt-driven autonomous consumption among the determinants of aggregate demand and growth, an inclusion that might also be useful to assess the sustainability of such a growth process. I will contrast these models with an alternative one, based on the Sraffian supermultiplier

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<sup>1</sup> See Harvey, 2007; Palma, 2009; Vercelli, 2015.

<sup>2</sup> I will limit my attention to models which share broadly the “Keynesian Hypothesis” (Garegnani, 1992), according to which in the long period an independently determined level of aggregate demand generates the corresponding output. For a neoclassical account of the relationship among income inequality, private debt and financial crisis, see Kumhof et al., 2015.



approach,<sup>3</sup> and I will try to suggest that the latter can provide a more adequate interpretative tool. I will focus my attention on the characteristics and the viability of a growth process fueled by debt for consumption purposes. At the same time, I will attempt to shed some light on the inherent dangers and threats it poses to the financial stability of an economy. The analysis is necessarily highly stylized and neglects many important and relevant issues, such as wealth effects on consumption and a careful scrutiny of the functioning of a banking system in an endogenous credit money economy. Nonetheless, the article offers some insights into tendencies at work in capitalist economies in the last decades and contributes to the understanding of the complex relationship between credit, finance, and the real economy.

The paper proceeds as follows: section 1 surveys a selection of Neo-Kaleckian works on household debt and growth. It provides a discussion of some critical aspects of the models presented and it is claimed that their main weakness concerns their problematic treatment of demand components other than induced consumption and investment. Section 2 introduces and clarifies the alternative Sraffian supermultiplier approach to growth, with its focus on the role of the autonomous components of demand. Section 3 analyzes the macroeconomic implications of debt-financed consumption through an extended supermultiplier model with endogenous credit money and compares the results with those of the models presented in section 1. Some interesting findings on the stability of the debt/debtors' income and on the adjustment of the rate of accumulation to the rate of credit-financed consumption are presented here. The last section summarizes the aforementioned results and concludes.

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<sup>3</sup> In which the basic idea is the integration of the traditional Keynesian multiplier with a flexible accelerator.

## 1. Household consumer debt in the heterodox literature

In recent years a branch of non-neoclassical literature of Keynesian-Kaleckian-Steindlian inspiration has attempted an integration of household debt<sup>4</sup> into demand-led models of growth and of the business cycle, with the purpose of assessing from an analytical point of view the feasibility and the sustainability of the processes of debt-fueled consumption and of debt accumulation. On the one hand, access to credit guarantees debtors purchasing power that would not be otherwise available given their disposable income. On the other hand, it implies the piling up of debt stock that potentially increases the financial fragility of the economy. Moreover, debt has to be served and repaid and this represents a drag on future growth, unless additional loans are granted to a degree capable of sustaining aggregate demand.<sup>5</sup>

A simplified version of a neo-Kaleckian<sup>6</sup> model of growth with household debt can be built based on Dutt, 2006; Palley, 2010; Hein, 2012a. These authors begin their analysis with similar consumption functions,<sup>7</sup> which can be represented as

$$C^w = c_w[(1 - \Pi)Y - rD] + B \quad (1)$$

$$C^\Pi = c_\Pi(\Pi Y + rD) \quad (2)$$

where  $Y$  is current output,  $\Pi$  is the profit share,  $r$  is the interest rate,  $B$  is the new debt borrowed in the period, and  $D$  is the accumulated debt. Equation (1) shows that the workers/debtors consume a fraction of

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<sup>4</sup> It is important to note that the analysis presented in this paper refers to debt for consumption purposes and does not cover explicitly housing debt. Moreover, issues related to debt-financed investment too are neglected for the sake of simplicity.

<sup>5</sup> The neoclassical account of this process, based on the life-cycle theory of consumption, is completely different and assumes that rational agents get into debt in order to smooth their consumption over time and to insure themselves against fluctuations in the transitory component of their income, through a process of maximization of their lifetime utility. For a recent critique of this interpretation, see Kim et al., 2015.

<sup>6</sup> With this term I refer to the theoretical framework of growth and distribution models originally developed by authors like Rowthorn, 1981; and Amadeo, 1986.

<sup>7</sup> Similar consumption functions are presented in Palley, 1997, where the author considers also the possibility of direct loanable funds market lending.

their disposable income, given by the wage minus the interests on accumulated debt, plus  $B$ , the entire amount borrowed in the period. At the same time, according to (2), capitalists/creditors consume a (lower<sup>8</sup>) fraction of their disposable income, given by their income share plus the interest payments they receive on the stock of debt.<sup>9</sup>

It is possible to add a standard neo-Kaleckian accumulation function such as the following:<sup>10</sup>

$$\frac{I}{K} = g = \alpha + \beta(u - u_n) \quad (3)$$

where  $\alpha$  can be seen as the investors' assessed trend growth of sales and  $\beta$  as a parameter representing the investment's sensitivity to discrepancies between the actual ( $u$ ) and the normal ( $u_n$ ) degree of capacity utilization.

As Palley notices (Palley, 2010, p. 296, eq. 13), the steady-state equilibrium requires the further condition

$$\frac{B}{D} = \frac{I}{K} \quad (4)$$

according to which the stock of debt grows at the rate of capital accumulation.<sup>11</sup>

Let us define  $s = 1 - c_w(1 - \Pi) - c_\Pi\Pi$  as the aggregate marginal propensity to save, and  $v = K/Y^n$  as the normal capital/output technical coefficient.<sup>12</sup> The equilibrium degree of capacity utilization, obtained

<sup>8</sup> As done in most of the literature (see for example Kaldor, 1955), it is assumed that capitalists have a lower marginal propensity to consume than workers.

<sup>9</sup> Debt repayment is neglected in the discussed works.

<sup>10</sup> Dutt, 2006; Palley, 2010; and Hein, 2012b, employ slightly different formalizations for the investment behavior, but this does not affect the argument. For the sake of comparability, I employ the accumulation function of the 'canonical' neo-Kaleckian growth model (Lavoie, 2014). Shifting from a canonical neo-Kaleckian investment function to a Marglin-Bhaduri's one would not solve the problems mentioned in this paragraph. On the Marglin-Bhaduri model and the supermultiplier, see Pariboni, 2016.

<sup>11</sup> In Palley, 2010, repayment of the debt principal is neglected, hence gross and net debt flows coincide.

<sup>12</sup> As usual in the non-neoclassical aggregate growth literature since Harrod, the dependence of the capital-output ratio on income distribution and on the composition of output is neglected.

by solving for  $u$  the goods market equilibrium condition,  $I/K = S/K$ , is equal to

$$u^{eq} = \frac{\left[ \alpha - \beta u_n + \frac{B - (c_w - c_\pi) r D}{K} \right]}{\left( \frac{s}{v} - \beta \right)} \quad (5a)$$

The imposition of condition (4) guarantees that  $[B - (c_w - c_\pi) r D]$  and  $K$  grow at the same rate and that  $u^{eq}$  does not change continuously. In order to see this, it is possible to rearrange equation (5a). Let us define  $d = D/K$ , the ratio of the stock of debt to capital, and substitute  $B/K$  for  $gd$ ,<sup>13</sup> reminding that  $g = \alpha + \beta(u - u_n)$ . Solving for  $u$ , we can express the equilibrium degree of capacity utilization as

$$u^{eq} = \frac{[(\alpha - \beta u_n)(1 + d) - (c_w - c_\pi) r d]}{\left[ \frac{s}{v} - \beta(1 + d) \right]} \quad (5b)$$

where the numerator and the denominator of  $d$  grow, by assumption, at the same rate, and  $d$  is constant.

Condition (4) is crucial to characterize the position alternatively represented by (5a) or (5b) as a persistent equilibrium. Indeed, only if  $B/D = I/K$  holds, does  $u^{eq}$  not change period after period. This is due to the fact that the pace of total consumption (induced plus credit-financed) is determined by the rate of accumulation – equal to  $g^{eq} = \alpha + \beta(u^{eq} - u_n)$  – which implies that the growth rate of aggregate demand too coincides with it. As a consequence, the numerator ( $Y$ ) and denominator ( $Y^n$ ) of the degree of capacity utilization grow in step.<sup>14</sup>

Nonetheless, if loans to workers ( $B$ ) are financed through endogenous credit money, their course is determined by workers' demand for credit – in principle independent and autonomous from the pace of capital accumulation – subject to the credit constraints imposed by banks.<sup>15</sup> If this is the case, no theoretical justification is left for (4) aside from the imposition of the steady-state condition, nor is

<sup>13</sup> The equality  $B/K = gd$  derives from equation (4).

<sup>14</sup> From the definition of  $v = Y/Y^n$  and under the assumption of the constancy of this ratio, we can see that  $g^{Y^n} = g^K$ .

<sup>15</sup> Indeed, endogenous money does not imply that an indefinite amount of debt is available to borrowers, unless neoclassical, perfectly efficient markets are assumed.

any obvious mechanism available to bring the accumulation of debt in line with the accumulation of capital.

In Dutt, 2006, an explicit mechanism is proposed: a functional expression for the desired level of borrowing  $B_d$  is given by  $B_d = b[(1 - \Pi)Y - rD]$ , with the assumption that  $B_d = B$ . In this way the demand for loans grows in line with income and output and condition (4) is satisfied, but debt-financed consumption turns out to be induced by output, differently from the process the present paper seeks to describe. Moreover, as noted by Hein, 2012b, p. 16:

“Dutt’s models [but the same holds true also for Palley, 2010] include a built-in stabiliser, because he assumes that the desired lending of capitalists (or rentiers) to workers’ households, or the desired debt of workers’ households from the perspective of the capitalists (or rentiers) is determined and thus restricted by workers’ income net of interest payments. He thus excludes cumulative increases, and hence instability, of workers’ debt-income or debt-capital ratios”.

For this reason, it seems reasonable to claim that Dutt’s and Palley’s stabilizer does not allow to completely capture the tendencies at work during the ‘neoliberal era’, with the related explosion in the household debt to income ratio across most OECD countries.

Apparently, the necessity of such strict assumption lies in the very basic structure of the neo-Kaleckian growth model. In this model, the economy is investment-driven, so that the rate of accumulation determines the rate of growth of aggregate demand and consequently of output. This view is consistent either (i) with the neglect of the components of demand other than induced consumption and investment, or (ii) with the *ad hoc* assumption that these autonomous components grow at the same rate of capital accumulation, which is independently given. The latter is exactly the case of the model discussed here, in which debt-financed consumption turns up to be induced by  $g$ . In this way, the *evolution* of debt-financed consumption does not play any autonomous role in shaping the pattern of aggregate

demand (and output) and its limited explanatory role is maintained only for the initial *level*<sup>16</sup> of the stock of debt.

However, the treatment presented in Hein, 2012b, appears equally problematic. After having introduced consumption functions identical to (1) and (2), the author explicitly states that “credit going to workers [...] depends on rentiers’ income and savings” (*ibid.*, p. 20), as indicated by

$$B = bS^{\Pi} = b(1 - c_{\Pi})(\Pi Y + rD) \quad (6)$$

where  $b$  represents the fraction of capitalists’ savings ( $S^{\Pi}$ ) devoted to finance workers’ debt, while  $(1 - b)S^{\Pi}$  is the amount of savings that contributes, together with workers’ savings, to equalize investment in equilibrium. This seems a quite restrictive assumption, which is at odds with the approach based on endogenous credit money presented in section 3.<sup>17</sup> From equation (6), a long-run equilibrium condition (*ibid.*, p. 27) analogous to equation (4) follows, whose logic is to be found in the fact that the pace of the debt-financed fraction of consumption is determined by the pace of capitalists’ savings, which are in turn induced by output growth.

Summing up, in the neo-Kaleckian approach the pattern of the demand for loans is shaped by the accumulation rate. Therefore, the former component plays only an ancillary role in determining aggregate demand growth. Nevertheless, it appears reasonable to maintain that debt-led growth processes can be better explained looking at the autonomous pattern of credit-financed consumption, its effects on the rate of growth of output and its macroeconomic consequences, even though the neo-Kaleckian model does not provide a fully satisfactory tool to perform this task.<sup>18</sup>

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<sup>16</sup> This is made evident by the presence of the term  $D$  in equation (5a).

<sup>17</sup> Similarly to Hein, 2012b; Isaac, Kim, 2013; and Kim et al., 2014, discuss models where the amount of credit available is determined by the amount of savings deposited in the banks by the capitalist class.

<sup>18</sup> As is well known, the neo-Kaleckian growth model has also been criticized because one of its main outcomes is an equilibrium level for the capacity utilization different from the normal one. Moreover, in this framework any attempt to restore a normal degree of

## 2. The supermultiplier

In this section, I will introduce a baseline version of the Sraffian supermultiplier model, proposed by Serrano, 1995a; 1995b, and further discussed and applied for example by Cesaratto et al., 2003, and Freitas, Serrano, 2015.<sup>19</sup> It is worth reminding that in this approach income distribution is treated, according to the Classical and Sraffian tradition, as exogenously determined by social and historical factors affecting the bargaining power of the opposite classes, by customs and social norms concerning the fairness of remunerations and other social habits (see, for example, Stirati, 1994, and Levrero, 2013). Accordingly, the model does not presume any automatic relation between the rate of accumulation and distribution or, in Garegnani's words (Garegnani, 1992, p. 64), "a long-period rise in investment needs not alter distribution in order to generate the corresponding savings",<sup>20</sup> due to the fact that any necessary amount of savings will be generated endogenously by the rise in the level of output entailed by an increase in effective demand. In the short run, the adjustment of savings to investment will take place through a degree of capacity utilization above the normal one. On the other hand, in the long run the process of accumulation is assumed to adapt capacity to demand, with firms' objective of producing at the desired level of capital utilization. Furthermore, associated with the given

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utilization generates Harroldian instability. For detailed discussions on these topics see Committeri, 1986; Skott, 2012; Hein et al., 2012; Cesaratto, 2015.

<sup>19</sup> Recently, Lavoie, 2003, and Allain, 2015, have formalized a neo-Kaleckian model with autonomous demand that produces basically the same results of the Sraffian supermultiplier model.

<sup>20</sup> Garegnani is referring here to the 'Cambridge Equation' approach proposed by Joan Robinson and Nicholas Kaldor (see Ciccone, 1986).



technology and real wage, a Sraffian system of normal, competitive<sup>21</sup> relative prices is assumed to hold.<sup>22</sup>

Let us consider a closed economic in which  $Y_t$ , the current level of output, is equal to aggregate demand, which is the sum of consumption, investment and public expenditure ( $G$ ):

$$Y_t = C_t + I_t + G_t \quad (7)$$

Consumption can be split into an induced component, financed out of wages and profits, and an autonomous component. The latter, in turn, is given by the sum of workers' autonomous consumption, financed out of endogenous credit money ( $C_t^a$ ) and capitalists' (including bankers') autonomous consumption expenditure ( $E_t$ ):

$$C_t = c(1 - \tau)Y_t + C_t^a + E_t \quad (8)$$

where  $c$  is the aggregate marginal propensity to consume and  $\tau$  is the tax rate. We may collect all the autonomous expenditures<sup>23</sup> and indicate them as

$$Z = G + C^a + E \quad (9)$$

which is equal to the sum of "all those expenditures that are neither financed by the contractual (wage and salary) income generated by production decisions, nor are capable of affecting the productive capacity of the capitalist sector of the economy" (Serrano, 1995a, p. 71).

Investment<sup>24</sup> is treated as completely induced; entrepreneurs invest to endow themselves with the capacity necessary to produce the amount they are demanded at normal prices. In its simplest version, defining  $h$  as the marginal propensity to invest of capitalist firms, this can be represented as

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<sup>21</sup> When talking about competition, I imply here the existence of sufficient capital mobility, such as to guarantee the uniformity of the rates of profit on alternative investment projects, as in the Classical tradition (Ciccone, 2011).

<sup>22</sup> It must be highlighted that I will not consider here the effect of growth on relative prices. The focus is on the study of quantities as a different logical stage with respect to the study of prices, without any intention to deny possible multiple mutual influences.

<sup>23</sup> In an open economy, exports are part of autonomous demand as well.

<sup>24</sup> I assume here that all capital is fixed, neglecting for simplicity circulating capital.

$$I_t = h_t Y_t \quad (10)$$

With  $s = 1 - c(1 - \tau)$  equal to the aggregate marginal propensity to save, we can express the long period, demand-determined output as<sup>25</sup>

$$Y_t = \frac{Z_t}{s - h_t} \quad (11)$$

While the level of output given by the autonomous components  $Z_t$  multiplied by the so-called supermultiplier does not necessarily imply a normal utilization of the productive capacity, a continuous tendency towards the latter is in operation. Firms are assumed to be continuously attempting to adjust their stock of capital, investing more when the degree of capacity utilization is higher than its normal level<sup>26</sup> and less, otherwise:

$$\dot{h} = h_t \gamma (u_t - 1) \quad (12)$$

with  $\gamma$  a positive reaction coefficient.<sup>27</sup> It is worth stressing that, differently from what happens in other approaches of Keynesian inspiration,<sup>28</sup> the mechanism implied by equation (12) provides an adjustment of capacity towards normal utilization that does not necessarily engender Harrodian instability. Indeed, in the supermultiplier model the presence of autonomous demand growing at an exogenous rate and not reacting when investment varies, makes aggregate demand and product (the numerator of  $u$ ) less reactive to

<sup>25</sup> For an economically meaningful result the condition  $s - h > 0$  must hold.

<sup>26</sup> I define the actual degree of capacity utilization as the ratio of actual over normal output, with the latter being in general lower than full capacity output (see Steindl, 1952, and Kurz, 1986). It follows that the normal degree of capacity utilization is equal to one ( $u_n = 1$ ).

<sup>27</sup> The logic underlying equation (12) can be summarized as follows: imagine that  $u = 1$ , when the economy experiences a permanent increase in the output rate of growth. At first, the degree of capacity utilization increases above its normal level, given that productive capacity is given in the short run. Entrepreneurs' reaction will be such that investment will grow faster than output (which means an increase in  $h$ ) until normal utilization is restored. When  $u = 1$  is attained, investment and output will grow again at the same rate, in order to maintain utilization at its desired level, and  $h$  will be constant at a higher level. See Girardi, Pariboni, 2015, for an extensive theoretical and empirical discussion of the relation between the output rate of growth and the investment share.

<sup>28</sup> See Hein et al., 2012.

an over-(under) utilization than productive capacity (the denominator of  $u$ ). Formally, we know that

$$\dot{u} = u(g - g^K) \quad (13)$$

with  $g$  equal to the rate of output growth and  $g^K$  the rate of accumulation.

From equations (11) and (12), we can derive the rate of growth of output:

$$g_t = g_t^Z + \frac{\dot{h}}{s - h_t} \quad (14)$$

while the rate of growth of capital<sup>29</sup> is given by

$$g_t^K = h_t \frac{u_t}{v} - \delta \quad (15)$$

Imposing  $\dot{h} = \dot{u} = 0$  in the system given by equations (12) and (13), we obtain the equilibrium position<sup>30</sup> of the model, which is characterized by

$$\begin{aligned} g_t &= g_t^K = g_t^Z \\ u_t &= 1 \\ h^* &= v(g^Z + \delta) \end{aligned} \quad (16)$$

This means that, if a given rate of growth of autonomous demand is sufficiently persistent, output and productive capacity of the economy tend to the position represented by the so-called “fully adjusted” supermultiplier (Cesaratto et al., 2003):

$$Y_t^n = \frac{Z_t}{s - v(\delta + g_t^Z)} \quad (17)$$

We also conclude that, along the equilibrium path, all the relevant variables evolve according to the rate of growth of the autonomous

<sup>29</sup> The equation follows from  $g^K = I/K - \delta$ , since the normal capital output ratio is equal to  $v = K/Y^n$ , and  $u = Y/Y^n$ ;  $\delta$  is the rate of capital depreciation.

<sup>30</sup> See Freitas, Serrano, 2015; Lavoie, 2014; and Allain, 2015, for an explicit analysis of the dynamic stability of the equilibrium. As Freitas, Serrano, 2015, make clear, a crucial requirement is that the investment share's reaction to deviations from normal utilization is sufficiently small so that the aggregate marginal propensity to spend is less than one in the proximity of the equilibrium.

components, capacity is normally utilized and entrepreneurs adjust their propensity to invest in order to maintain this desired degree of utilization.<sup>31</sup>

Of course, as pointed out by Dejuán, 2013a, p. 16, the model “does not imply that capitalism is a stable system. [...] It] simply suggests that economic instability usually stems from the volatility of the autonomous trend, not (necessarily) from the accelerator mechanism”. In other words, equation (17) does not describe any secular growth of capitalism. This equation has the more limited ambition to help explaining specific periods, episodes or modes of accumulation (and the seeds of forthcoming crises within them) as, for instance, the consumer debt-led growth of the ‘Great Moderation’ era that preceded the ‘Great Recession’ or the German export-led mercantilist model and the European financial unbalances that it created (see Cesaratto, Stirati, 2010). Although the neo-Kaleckian model too aims at explaining this variety of growth experiences (and crises), the above-mentioned difficulties of those models to accommodate the autonomous components of aggregate demand suggest the supermultiplier model as a most promising approach in this respect.

### **3. Household consumer debt and the supermultiplier**

For an alternative analysis of the growth effects of household debt accumulation, it is possible to use a modified version of the model introduced in the previous section, with endogenous credit money supplied by the banking system. Let us use the following consumption functions, similar to those presented in Dutt, 2006; Palley, 2010; and Hein, 2012b, and already introduced in section 1:

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<sup>31</sup> It is, however, important to recall that, during the disequilibrium adjustments, the degree of capacity utilization can be higher or lower than its normal level and the relevant rates of growth are allowed to diverge. It is exactly the possibility for the rate of accumulation to be higher or lower than the rate of growth of demand and output that allows to adjust productive capacity and to restore normal utilization in case of an exogenous shock.

$$C_t^w = c_w[(1 - \Pi)Y_t - (r + \phi)D_t] + B_t \quad (18)$$

with the interest rate,  $r$ , considered as given for the sake of simplicity, and  $\phi$  denoting the percentage of principal repaid every period. Capitalists' consumption is equal to

$$C_t^\Pi = c_\Pi \Pi Y_t \quad (19)$$

For the sake of simplicity, it is assumed that only workers borrow in order to finance part of their consumption.<sup>32</sup> Coherently with an endogenous credit money approach, as presented for example by Palley, 1997; Lavoie, 2003; and Fontana, Setterfield, 2009, I assume that the credit flow is endogenously determined by the demand for loans and the banking system is not constrained by the amount of deposits held in the same banks. In other words, loans create deposits and banks accommodate any request of funds by households, if they perceive it as profitable and if predetermined parameters of creditworthiness are respected. This implies that “banks can lend without affecting the consumption of their owners” (Palley, 1994, p. 374, footnote 2),<sup>33</sup> and allows us to treat  $B$  as workers' autonomous consumption, that is a “part of aggregate consumption financed by credit and, therefore, unrelated to the current level of output resulting from firms' production decisions” (Freitas, Serrano, 2015, p. 261).<sup>34</sup>

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<sup>32</sup> Moreover, it is assumed that workers can borrow and save at the same time, following in this respect Kim et al., 2014, since savings and debt are not perfect substitute. A further assumption is that, in case workers deposit their savings in a bank account, the interest they earn is negligible with respect to the interest they pay on the amounts borrowed, coherently with the nature of imperfect competition in real-world credit markets.

<sup>33</sup> Palley, 1997, and Palley, 2014, present a model of the business cycle with both loanable funds credit (called “direct finance”) and endogenous credit money (“indirect finance”), where it is pointed out that “direct finance involves a transfer of existing money balances, while bank-provided indirect finance involves the creation of new money balances. For this reason, bank-provided indirect finance has a larger effect on aggregate demand and goods market” (Palley, 1997, p. 135). Given that the present work centers its attention on the role of the autonomous components of demand and for the sake of simplicity, only indirect finance is considered here. However, in the special case with  $c_\Pi = 0$ , with all capitalists' consumption autonomous, Palley's distinction becomes irrelevant.

<sup>34</sup> Note, however, that in Freitas, Serrano, 2015, autonomous consumption is only capitalists'.

Neglecting for the moment the existence of autonomous components of demand other than workers' autonomous, debt-financed consumption, we have that

$$Y_t = c_w[(1 - \Pi)Y_t - (r + \phi) D_t] + B_t + c_\pi \Pi Y_t + h_t Y_t \quad (20)$$

Collecting the autonomous consumption terms as  $C_t^a = B_t - c_w(r + \phi)D_t$ ,<sup>35</sup> and provided that the rate of growth of  $B$  is sufficiently persistent, the fully adjusted equilibrium position is given by

$$Y_t^n = \frac{C_t^a}{s - v(\delta + g_t^Z)} \quad (21)$$

Therefore, in equilibrium, we have

$$g = g^{C^a} \quad (22)$$

As argued in section 2 this result implies that, given enough time, demand and output will tend to evolve at the rate of growth of the autonomous components of demand: in this case, workers' autonomous consumption.

The reliance on the credit conceded by the banking system leads to a growth process that can go on indefinitely only if banks are willing to keep conceding indefinitely growing loans (that is, a positive rate of growth for  $B$  and  $C^a > 0$ ). The problem is that banks' behavior is not driven by demand support concerns. Instead, we can reasonably assume that they continue to lend up to the point they perceive it as too risky and no more profitable. In this respect, it can be interesting to trace the path of the debt/debtors' income ratio, as a measure of the financial solidity of the economy.<sup>36</sup> This ratio is a fundamental indicator of workers' solvency and therefore is one of the most important parameters on the basis of which the banking system will decide whether to keep supplying credit or not. Stated otherwise, if banks observe that the borrowers' solvency ratio approaches or exceeds a predetermined ceiling, they can reasonably stop granting

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<sup>35</sup> The term  $c_w(r + \phi)D_t$  can be seen as negative autonomous consumption.

<sup>36</sup> See also Bhaduri et al., 2006, where the authors argue that "it is plausible in this context to postulate that the macroeconomic criterion of creditworthiness that operates ultimately is the debt to income ratio of the private sector" (p. 420).

credit (and/or they increase the rate of interest and the repayment coefficient demanded on the stock of debt), provoking in this way a fall in aggregate demand and possibly triggering a recession, induced by a negative growth rate of autonomous consumption and the related process of deleveraging.

It can be proved that the rate of growth of autonomous consumption,  $g^{C^a}$ , and the rate of growth of debt,  $g^D$ , tend to coincide. As a first step, let us divide by  $D$  both sides of the expression  $C_t^a = B_t - c_w(r + \phi)D_t$ . Since the evolution of the stock of debt is described by  $\frac{dB}{dt} = B - \phi D$ ,<sup>37</sup> from which  $\frac{B}{D} = g^D + \phi$  follows, then  $\frac{C^a}{D} = g^D + \phi - c_w(r + \phi)$ . Taking the logarithm of this equation and deriving it with respect to time, we obtain

$$\dot{g}^D = (g^{C^a} - g^D)[g^D + \phi - c_w(r + \phi)] \quad (23)$$

Let us assume, throughout the analysis, that autonomous consumption is positive:

$$C^a = B - c_w(r + \phi)D > 0 \quad (24)$$

From condition (24), it follows that  $g^D + \phi - c_w(r + \phi) > 0$ .<sup>38</sup> Together with equation (23), this tells us that the rate of debt accumulation  $g^D$  changes as long as it is different from  $g^{C^a}$ , and converges to the latter (if  $g^{C^a} > g^D$ , then  $\dot{g}^D > 0$  and vice versa), so that in equilibrium autonomous consumption and debt grow at the same rate, i.e.  $g^{C^a} = g^D$ , both equal to  $g^Y$ , as argued above (see equation 22). This condition is analogous to equation (4) (that is, equation 13 in Palley, 2010, p. 296) but the direction of causality is reversed: in Palley's analysis, the growth of debt-financed consumption is assumed to be driven by the accumulation rate. In the present case, it is the rate of growth of autonomous consumption to drive the rate of growth of output (and the rate of capital accumulation).

<sup>37</sup> From period  $t$  to  $t + 1$ , the stock of debt increases because of new loans ( $B$ ); at the same time, a percentage  $\phi$  of the debt principal is repaid every period.

<sup>38</sup> From  $B - c_w(r + \phi)D > 0$ , dividing by  $D$  and recalling that  $B/D = g^D + \phi$ , we obtain  $g^D + \phi - c_w(r + \phi) > 0$ .

Having assumed that in the simple economy represented by equation (21) only workers borrow to finance their consumption, it is possible to conclude that the ratio  $d_t = D_t / (1 - \Pi)Y_t$  is stable as long as the wage share is constant, given that in equilibrium the numerator and the denominator grow at the same rate.

Hence, if consumer debt is the only source of autonomous demand, the rate of growth of debt is never too high,<sup>39</sup> because of its specular impact on output growth. Any increase in the profit share, on the contrary: (i) does not affect the rate of growth of output but decreases the disposable income of debtors;<sup>40</sup> (iii) has a negative effect on the *level*<sup>41</sup> of output because of a higher marginal propensity to consume out of wages; and (iii) worsens the *d* ratio. This means that – in spite of the fact that debt-financed consumption directly affects the course of aggregate income and consequently also of indebted workers' income – if indebtedness comes with a marked increase in income inequality, the capitalists tend to appropriate most of the increase in income generated by the expansion of consumption financed out of credit.<sup>42</sup>

The inclusion in the model of the other autonomous components of demand, denoted by  $Q$ , adds a new relevant dimension to the analysis of the stability of the debt/income ratio. Indeed, with  $Z_t = C_t^a + Q_t$ , we have that

$$Y_t^n = \frac{Z_t}{s - v(\delta + g_t^Z)} \quad (25)$$

and

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<sup>39</sup> However, as pointed out in Freitas, Serrano, 2015, p. 272, for a demand-led growth regime to be viable, the rate of growth of autonomous demand must be lower than a threshold depending on income distribution (and the implied aggregate propensity to save  $s$ ), technical conditions and the investment's reaction coefficient  $\gamma$ .

<sup>40</sup> A decrease in the wage share could also, in principle, have a positive effect on the *level* of household debt, though contributing to a worsening of the *d* ratio.

<sup>41</sup> For a careful discussion of level and growth effects in a supermultiplier framework, see Freitas, Serrano, 2015.

<sup>42</sup> Along these lines, Barba, Pivetti, 2009, provide an interpretation of the processes that led to the Great Recession.



$$g_t^Z = g_t^{C^a} \frac{C_t^a}{Z_t} + g_t^Q \frac{Z_t - C_t^a}{Z_t} \quad (26)$$

where the rate of growth of  $Z$  is a weighted average of the rates of growth of its components, with the weights represented by the components' share in  $Z$ . Equation (26) implies also that the economy's growth rate slowly converges to the growth rate of the fastest growing autonomous component.

Thus, it is easy to see that if debt-financed consumption grows more rapidly than the other terms of  $Z$ , it follows that  $g^D > g^Z = g$  and, even with a constant wage share, the ratio of debt over debtors' income continuously increases. This is due to the fact that, in this scenario, the accumulation of debt is faster than the growth of the whole autonomous part of demand, which determines the rate of growth of output.

It is possible to conclude that the sustainability of the private debt position of an economy depends, among other things, on the rate of growth of public expenditures and capitalists' autonomous consumption. Indeed, these two autonomous demand components contribute to the determination of the growth rate of output together with credit-financed consumption. Accordingly, the growth differential between  $C^a$  (whose evolution tends to shape the pattern of the stock of personal debt) and the other parts of autonomous demand is a main factor in explaining the path of the households' debt to income ratio.

Comparing this result with extant literature on the topic we may note that, differently from the models discussed in section 1, in the present work the path of autonomous demand, of which debt-financed consumption is a component, determines output growth. Since investment is treated as fully induced, the rate of capital accumulation will tend to adjust to  $g^Z$ . On the contrary, in the neo-Kaleckian models discussed above, the pattern of the demand for loans is shaped by the independently determined accumulation rate.

To conclude the analysis, it is possible to examine the impact of changes in some exogenous variables and parameters on the fully adjusted equilibrium position of the model. In both cases, of workers'

debt-financed consumption as the only source of autonomous demand – equations (21) and (22) – and in the presence of other autonomous components – equations (25) and (26) – the following holds:

- an increase in the profit share has a negative effect on output level because it is assumed that workers have a higher marginal propensity to consume, but it has no effect on the rate of growth of the economy;
- an increase in the exogenous rate of interest  $r$ , or in the percentage of principal's repayment  $\phi$ , negatively affect the level of output but do not have any permanent effect on its growth rate;<sup>43</sup>
- a permanent increase in the rate of growth of  $B$  implies a permanent and equal increase in the rate of growth of workers' autonomous consumption ( $g^{C^a}$ ) and in the rate of debt accumulation ( $g^D$ ). The rate of output growth rises as well.

The analysis presented in this article naturally has several shortcomings and limitations. Just to mention a few, the description of the functioning of the banking system is extremely stylized here. Indeed, banks are simply assumed to accommodate any demand for loans until some ceiling for the solvency ratio is approached. A more detailed and realistic assessment of financial mechanisms is outside the scope of this work and further investigation is required in this respect. Moreover, the impact of wealth effects on consumption is neglected. Bhaduri et al., 2006; Zezza, 2008; and Bhaduri, 2011, provide promising bases for future research on the relationship between wealth, creditworthiness and debt accumulation. Moreover, all results need to be taken with caution. They require and reflect particular institutional arrangements, such as those allowing for a debt-led growth process, which are the object of the present article. Deleveraging, debt-burdened growth, the impact of credit crunch etc. are relevant, intertwined, and specular phenomena, but lie outside the scope of this work.

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<sup>43</sup> However, increases in  $r$  could turn workers' autonomous consumption negative and cause, *ceteris paribus*, negative rates of growth and a downward spiral of output. I am assuming here that the rate of interest and the repayment percentage are such that  $C^a > 0$ .

## Conclusions

The process of private indebtedness is one of the most important economic phenomena of the last few decades. Its significance is due to its diffusion and relevance in financing households' consumption, given the contemporary relative worsening in income for the vast majority of the population in several capitalist economies. As a consequence, an increasing effort has been devoted, mostly by heterodox economists, to develop an analytical framework capable of investigating the relationship between household debt and growth.

In this paper, I maintained that the neo-Kaleckian approach exhibits some unsatisfactory features. In particular, in these models debt-financed consumption does not play a truly autonomous role in explaining aggregate demand and output growth, and it appears as ancillary and passive with respect to an independently determined accumulation rate.

If, on the contrary, we employ a supermultiplier model integrated with an explicit consideration of household debt financed through endogenous credit money, several results follow: among these, the path of autonomous consumption emerges as one of the factors driving output growth and, as a consequence, the rate of accumulation. Indeed, in this model investment is treated as completely induced by output and it is done with the purpose of endowing the economy with the productive capacity necessary to meet expected demand at the normal degree of capacity utilization. For this reason, in the simplified model presented, accumulation adjusts to the exogenously given rate of growth of autonomous demand.

Hence, differently from the neo-Kaleckian models on the same topic, it is output growth that adjusts to debt-financed consumption, coherently with a demand-led growth framework. Therefore, the supermultiplier model could provide a more fruitful interpretative tool in the attempt to investigate the debt-fueled growth period that preceded the Great Recession.

In this respect, the other main result concerns the stability of the outstanding debt/debtors' income ratio, which has been proved to be affected, among other things, by the growth differential between workers' autonomous consumption (and debt) and the other autonomous components of demand. This suggests that public expenditure and capitalists' autonomous consumption are main actors in determining the sustainability of the private debt position of an economy.

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